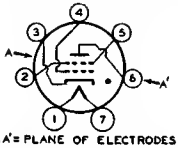
3D22-A
GAS THYRATRON

Mechanical:

Mounting Position	Any
Maximum Overall Length	4-5/8"
Maximum Seated Length	4"
Maximum Diameter	2-3/8"
Weight (Approx.)	5 oz
Bulb	T-16
Base	Medium-Metal-Shell Giant 7-Pin with Bayonet (JETEC No.A7-17)
Basing Designation for BOTTOM VIEW	7BV

Pin 1 – Heater
Pin 2 – Grid No.2
Pin 3 – Cathode
Pin 4 – Grid No.1



AA'= PLANE OF ELECTRODES

Pin 5 – Grid No.2
Pin 6 – Anode
Pin 7 – Heater

RELAY AND GRID-CONTROLLED RECTIFIER SERVICE

Maximum Ratings, *Absolute Values:*

PEAK ANODE VOLTAGE:		
Forward	650 max.	volts
Inverse	1500 max.	volts
GRID-No.2 (SHIELD-GRID) VOLTAGE:		
Peak, before tube conduction	-100 max.	volts
Average#, during tube conduction	-10 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Peak or DC, before tube conduction	-200 max.	volts
Average#, during tube conduction	-10 max.	volts
CATHODE CURRENT:		
Peak	8 max.	amp
Average#	0.8 max.	amp
Fault, for duration of 0.1 second max.	30 max.	amp
AVERAGE GRID-No.2 CURRENT#	+0.1 max.	amp
AVERAGE GRID-No.1 CURRENT#	+0.05 max.	amp
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	25 max.	volts
AMBIENT-TEMPERATURE RANGE	-75 to +90	°C

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	2 max.	megohms

Averaged over any interval of 30 seconds maximum.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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NEGATIVE-CONTROL TETRODE TYPE

Supersedes Type 3D22

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

	Min.	Av.	Max.	
Voltage	5.7	6.3	6.9	ac or dc volts
Current at 6.3 volts	–	2.6	2.85	amp

Cathode:

Minimum heating time prior to tube conduction	30	sec
Maximum outage time without reheating	3	sec

Direct Interelectrode Capacitances (Approx.):[o]

Grid No.1 to anode*	0.1	μμf
Grid No.1 to cathode, grid No.2, base shell, and heater	8.5	μμf
Anode to cathode, grid No.2, base shell, and heater	4.6	μμf

Ionization Time (Approx.):

For conditions: dc anode volts = 100, grid-No.1 square-pulse volts = +100, and peak anode amperes during conduction = 8	0.5	μsec

Deionization Time (Approx.):

For conditions: dc anode volts = 125, dc grid-No.1 volts = -200, grid-No.1 resistor (ohms) = 1000, and dc anode amperes = 0.8	150	μsec
For conditions: dc anode volts = 125, dc grid-No.1 volts = -14.8, grid-No.1 resistor (ohms) = 1000, and dc anode amperes = 0.8	400	μsec

Maximum Critical Grid-No.1 Current: For conditions: ac anode-supply volts = 460 (rms), and average anode amperes = 0.8	0.8	μamp
Anode Voltage Drop (Approx.)	10	volts

Grid-No.1 Control Ratio (Approx.):

For conditions: grid-No.1 resistor (megohms) = 0 to 0.1, grid-No.2 resistor (megohms) = 0, and grid-No.2 volts = 0	150

Grid-No.2 Control Ratio (Approx.):

For conditions: grid-No.1 resistor (megohms) = 0, grid-No.2 resistor (megohms) = 0 to 0.1, and grid-No.1 volts = -3	650

[o] Without external shield.

* With all other electrodes and base shell connected to ground.

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SPECIAL PERFORMANCE TESTS

Made in conformance with indicated sections of MIL-E-1B Specifications dated 2 May 1952

4.9.19.2 (F-66) High-Frequency Vibration:

The tube is rigidly mounted on a table vibrating with simple harmonic motion at a frequency of 50 ± 2 cps with a fixed amplitude of 0.040" ± 0.0025" (total excursion is double the amplitude). Maximum acceleration is 10g. No voltage is applied during vibration. Tube is vibrated for 10 minutes in such manner that table motion is along shortest line between anode and cathode. This test will not cause tube to be inoperative.

4.10.19 (F-64) Thyratron High-Voltage Operation:

	Min.	*Max.*	
Grid-No.1 Supply Voltage (1)	-4.4	-9.2	volts

This test is made after two light taps with a felt hammer (similar to type used for noise tests) in direction from cathode to anode under the following conditions: heater voltage of 6.3 volts rms, anode supply voltage of 500 volts rms, grid No.2 tied to cathode, load resistance of 2000 ohms, and grid-No.1 circuit-resistance of 2 megohms. Tube conduction is indicated by an oscilloscope connected between anode and cathode and ceases when the grid-No.1 supply voltage is increased negatively within indicated range.

Grid-No.1 Supply Voltage (2)	-4.4	-9.2	volts

This test is made as for Grid-No.1 Supply Voltage (1), except that the taps are made in direction from anode to cathode.

Voltage Difference		1	volt

The difference between the value of grid-No.1 supply voltage in the first and second grid-No.1 supply voltage tests will not exceed the specified value.

OPERATING CONSIDERATIONS

Sufficient *anode-circuit resistance*, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.

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GRID-CONTROLLED RECTIFIER CIRCUITS

DC Voltage Control

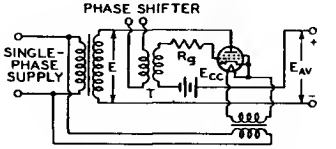

FIG. 1 HALF-WAVE SINGLE-PHASE

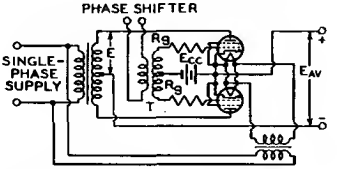

FIG. 2 FULL-WAVE SINGLE-PHASE

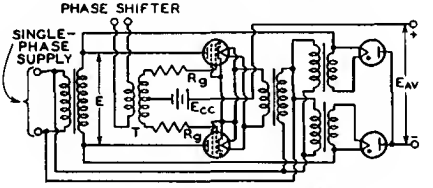

FIG. 3 SERIES SINGLE-PHASE

AC Voltage Control

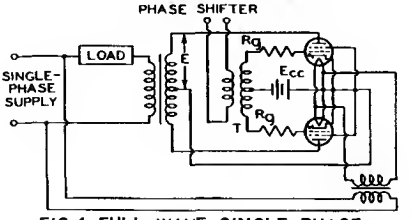

FIG. 4 FULL-WAVE SINGLE-PHASE

NOTES

92CL-8596

T = PEAKING TRANSFORMER

IN FIG. 3, THE RECTIFIER TUBES MAY BE 3D22-A's USED AS DIODES. THE 3D22-A IS USED AS A DIODE BY CONNECTING GRIDS №2 AND №1 TO CATHODE (PIN 3)

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.

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GRID-CONTROLLED RECTIFIER CIRCUITS

Numerical Relationships Among Electrical Quantities

E = Trans. Sec. Voltage (RMS)
E_{av} = Average DC Output Voltage
E_{bmf} = Peak Forward Anode Voltage
E_{bmi} = Peak Inverse Anode Voltage
E_m = Peak DC Output Voltage
E_r = Major Ripple Voltage (RMS)
f = Supply Frequency
f_r = Major Ripple Frequency
I_{av} = Average DC Output Current
I_b = Average Anode Current
I_p = Anode Current (RMS)
I_{pm} = Peak Anode Current
P_{ac} = Load Volt-Amperes
P_{al} = Line Volt-Amperes
P_{ap} = Trans. Pri. Volt-Amperes
P_{as} = Trans. Sec. Volt-Amperes
P_{dc} = DC Power $(E_{av} \times I_{av})$

Note: Conditions assumed involve sine-wave supply; zero voltage drop in tubes; no losses in transformer and circuit; no back emf in the load circuit; and no phase-back.

RATIO	Fig. 1	Fig. 2	Fig. 3	Fig. 4
Voltage Ratios				
E/E_{av}	2.22	1.11	1.11	–
E_{bmi}/E	1.41	2.83	1.41	1.41
E_{bmi}/E_{av}	3.14	3.14	1.57	–
E_m/E_{av}	3.14	1.57	1.57	–
E_r/E_{av}	1.11	0.472	0.472	–
E_{bmf}/E:				
Resistive Load	1.41	1.41	1.41	1.41
Inductive Load■	1.41	2.83	1.41	1.41
Frequency Ratio				
f_r/f	1	2	2	–
Current Ratios				
I_p/I_{av}	1.57	0.785	0.785	–
I_b/I_{av}	1	0.5	0.5	–
Resistive Load				
I_{pm}/I_{av}	3.14	1.57	1.57	–
I_{pm}/I_b	3.14	3.14	3.14	3.14
Inductive Load■				
I_{pm}/I_{av}	—	1	1	–
Power Ratios				
P_{ac}/I_bE_{bmf}	—	–	–	1.57
Resistive Load				
P_{as}/P_{dc}	3.49	1.74	1.24	–
P_{ap}/P_{dc}	2.69	1.23	1.24	–
P_{al}/P_{dc}	2.69	1.23	1.24	–

■: See next page.

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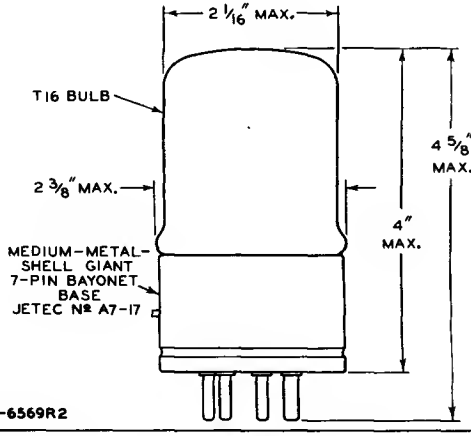
RATIO	Fig. 1	Fig. 2	Fig. 3	Fig. 4
Power Ratios (Cont'd)				
Inductive Load■				
P_{as}/P_{dc}	—	1.57	1.11	–
P_{ap}/P_{dc}	—	1.11	1.11	–
P_{al}/P_{dc}	—	1.11	1.11	–

■ The use of a large filter-input choke is assumed, except for the circuit in Fig. 4.

CIRCUIT Single-Phase	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}	MAX. DC OUTPUT WATTS TO FILTER P_{dc}	MAX. AC OUTPUT VOLT-AMPERES P_{ac}
Fig. 1 Half-Wave	460	205	0.8	165	–
Fig. 2 Full-Wave:					
Resistive Load	460	410	1.6	660	–
Inductive Load	230	205	1.6	330	–
Fig. 3 Series	460	410	1.6	660	–
Fig. 4 Full-Wave	460	–	–	–	800



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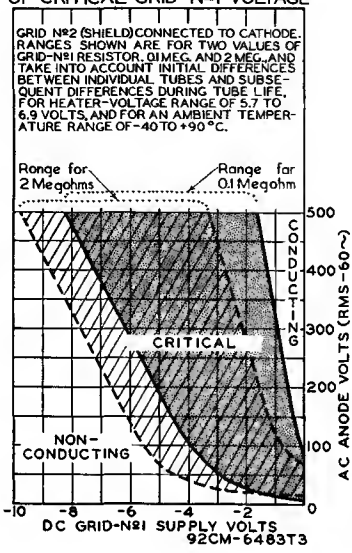
GAS THYRATRON

OPERATIONAL RANGE OF CRITICAL GRID-№1 VOLTAGE



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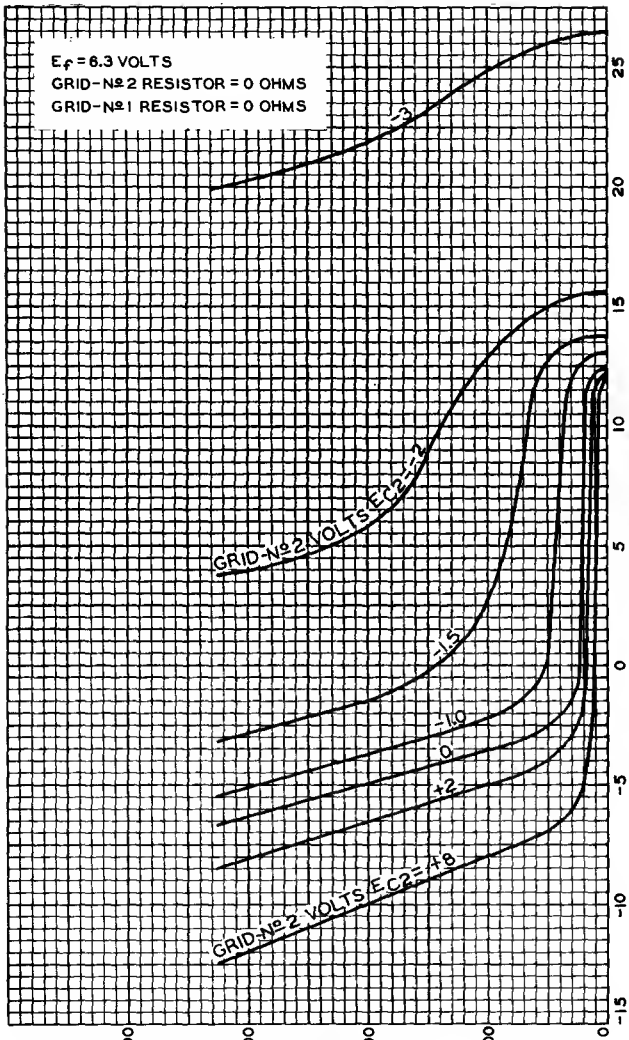
AVERAGE CONTROL CHARACTERISTICS



JAN. 22, 1947

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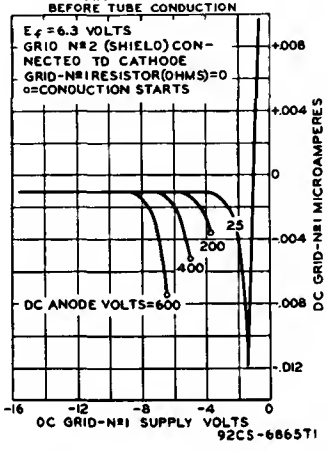
CHARACTERISTIC CURVES

AVERAGE GRID-Nº1 CHARACTERISTICS
BEFORE TUBE CONDUCTION



AVERAGE GRID-Nº1 CHARACTERISTICS
DURING TUBE CONDUCTION